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ABSTRACT

Paired associate memory was tested with imagery and repetition instructions, with and without background music. Subjects were 64 students enrolled in an introductory psychology course. Music was found to have no effect with imagery instructions, but significantly improved performance with the repetition instructions. Music had different effects on the relationship between cognitive style and imagery in the two instruction conditions. Imagery and right hemisphere scores were negatively correlated when music was used with repetition, but positively correlated when music was used with imagery instructions. The results support Bakan's distinction between raw, right hemisphere imagery and cooked, left hemisphere imagery. (Author/RM)

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Imagery, Music, Cognitive Style and Memory

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Abstract

Paired associate memory was tested with imagery and repetition instructions, with and without background music. Music had no effect with imagery instructions, but significantly improved performance with the repetition instructions. Music had different effects on the relationship between cognitive style and imagery in the two instruction conditions. Imagery and right hemisphere scores were negatively correlated when music was used with repetition, but positively correlated when music was used with imagery instructions. The results support Bakan's distinction between raw, right hemisphere imagery and cooked, left hemisphere imagery.

The formation of images is well established as a technique which can be used to enhance memory (Bower, 1972; Paivio, 1969). Imagery is emerging as an important process not only in memory, but also in other areas such as therapy, and it is therefore critical to achieve a better understanding of the various factors which may influence it.

Music and cognitive style may be two variables which affect imagery. In a previous study (Stratton and Zalanowski, 1983) we found that cognitive style defined as left hemisphere (LH) or right hemisphere (RH) processing predicted the vividness of imagery, with RH subjects having more vivid images. The presence of background music, however, interacted with cognitive style, leading to lower vividness ratings with RH but not with LH subjects. The present study further examined this relationship by testing the effect of background music on paired-associate performance following imagery and repetition instructions among subjects with varying degrees of hemisphere preference.

Method

Subjects

Sixty-four students enrolled in an introductory psychology course volunteered as subjects and received extra course credit. There were 27 males and 37 females, and the average age was 21.5 years.

Procedure

Subjects were run in groups of 6 to 10. Seating was arranged in a circle facing out. A paired associate task modeled after Bower (1972) was used. Two lists of paired, concrete nouns were presented aurally on a tape to the subjects with instructions to form an association between the items of each pair. Subjects in the imagery condition were told to form a mental picture of the two objects interacting in some way. Subjects in the repetition condition were told to repeat the word pairs over and over to themselves. Each list had 20 pairs presented at the rate of 5 seconds per pair. Immediately following each list a cued recall test was given in which the first word was read on the tape, subjects were given 8 seconds to write down their response, and then the correct response was given. After the second test, all 40 pairs were tested again. Finally, all subjects were asked to indicate for what percentage of the pairs they had formed images and to rate the average vividness of their images of a scale of 1-10. Approximately half of the subjects in each instruction condition performed the task with normal room sounds, while the others worked with a background tape of MUZAK playing.

All subjects filled out the Herrmann Participant Survey Form (Herrmann, 1983), a test which measures LH - RH cognitive style.

Results

Subjects in the imagery condition correctly recalled 74% and 79% on lists 1 and 2 without music, and 78% and 84% with music. Music had no significant effect in this condition. Subjects in the repetition condition correctly recalled 53% and 63% on lists 1 and 2 without music, and 73% and 83% with music. Combining the scores on lists 1 and 2, performance in the repetition condition was significantly better with music than without ($t = 2.80$, $df = 26$, $p < .01$). This same effect was found with the delayed test of both lists ($t = 2.26$, $df = 26$, $p < .05$). Subjects in the imagery condition reported more imagery (87%) than subjects in the repetition condition (70%), and there was a slightly greater incidence of imagery in each music condition, but it was not a significant effect. Reported vividness of imagery was approximately the same for all groups.

Correlations were calculated between cognitive style scores and recall scores on the combined immediate tests, and between cognitive style scores and imagery use and vividness. These correlations are shown in Tables 1, 2 & 3. Although none of the correlations are significant, there is a consistent trend. In the repetition condition, performance, amount of imagery used, and vividness of imagery are all positively correlated with right hemisphere scores when no music was present, but negatively correlated when music was

played. These relationships tend to be reversed in the imagery condition. Especially interesting is the positive correlation of +.401 between RH scores and imagery vividness in the imagery, music condition, contrasted with the negative correlation of -.465 in the repetition, music condition.

Finally, and not surprisingly, performance was highly positively correlated with imagery usage and imagery vividness in all conditions.

Discussion

The results for the two no music groups correspond closely with those reported by Bower (1972); the use of imagery clearly improves performance on paired associate tasks. The results for the repetition with music condition are interesting. The presence of background music apparently improved the performance of subjects in that condition to a point equal to that of subjects who were instructed to use imagery. Various explanations have been offered for other beneficial effects of music -- relaxation, stimulation, rhythm. While one or more of these may have been operating here, it also appears that the music activated more imagery in this group. Although it was not a significant difference, there was a greater amount of imagery and more vivid imagery when music was used with the repetition instructions.

In examining the relationship between cognitive style and imagery, the correlations found in the repetition conditions are consistent with our previous findings (Stratton and Zalanowski, 1983). The more right hemisphere oriented the subject, the greater amount and vividness of imagery when no music was present. Background music, however, seems to interfere with imagery in RH subjects, leading to negative correlations between those two variables. This is understandable if it is assumed that both imagery and music processing are right hemisphere functions and would be more intense in RH subjects. However, the relationships were reversed in the imagery instructions conditions. Here there was no relationship between hemisphere preference and imagery in the no music condition, and with music there were positive correlations between RH scores and imagery use and vividness. Why should such different relationships be found based upon the types of instructions given? These results may provide support for Bakan's (1980) theory proposing two kinds of imagery: raw, which is spontaneous imagery of the right hemisphere, and cooked, which is a processed imagery of the left hemisphere. When specific instructions and examples are given on how to use images for the memory task, the resulting imagery is undoubtedly "cooked" and thus presumably a left hemisphere function. The right hemisphere music perception would thus no longer create interference. Imagery which occurs when no specific imagery instructions are given would,

conversely, be spontaneous, or raw. Future research needs to further examine this interaction between music, cognitive style, and imagery.

Table 1. Correlations between performance and right hemisphere scores.

	No Music	Music
Repetition	+.218	-.399
Imagery	-.219	+.142

Table 2. Correlations between percentage of imagery used and right hemisphere scores

	No Music	Music
Repetition	+.430	-.198
Imagery	-.017	+.343

Table 3. Correlations between vividness of imagery and right hemisphere scores

	No Music	Music
Repetition	+.504	-.465
Imagery	+.185	+.401

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